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(54) BULK PACKAGE FOR INDIVIDUAL DISPENSING
OF SUBSTANTIALLY WET SHEETS FROM STACKS

(71) We, INTERNATIONAL PLAYTEX INC., a Corporation organised and existing under the laws of the State of Delaware, United States of America, of 888 Seventh Avenue, New York, New York 10019 United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the bulk packaging and convenient individual dispensing of substantially wet sheets, tissues or towellettes such as may be utilised for personal hygiene, for cosmetic purposes, household cleaning applications or the like. More particularly, it relates to a package for individually "popping-up" and dispensing such wet sheets overcoming the relatively high attractive forces between the wetted sheets which tend to resist individual dispensation and produce "chaining" thereof, and from which dispenser any number of the wet sheets may be removed or replaced at will.

In the following specification and in the claims appended hereto, all references to "wet" or "substantially wet" sheets are intended to refer to sheet materials so wetted by an aqueous or other desired treatment medium that when they are wiped across a surface it is streaked by the liquid medium. The "wet" sheets employed in accordance herewith are believed to possess sufficient moisture contents (aqueous or otherwise) to form surface films thereon. It is postulated that the surface tension of these films produces the substantial forces between the wet sheets preventing sequential dispensing of the individual sheets employing conventional means.

On the other hand, the wet sheets dispensed from the bulk package hereof are not loaded with moisture contents ex-

ceeding their holding capacities by more than a small quantity, i.e., ideally the amount of free liquid in the package, if any, should not exceed about 10% by volume of the container. In one preferred embodiment, employing aqueous treatment media and a selected absorbent paper toweling stock, the wet sheets hereof may typically have liquid contents of from about 80 to 500%, preferably about 100-400%, of their total weight. Materials thus wetted have a softer feel than their dry counterparts and can transfer sufficient liquid to wet other surfaces to effect the desired cleansing or like functions.

As further used herein, the term "sheets" will be understood to comprehend liquid-holding papers or similar sheet materials composed, for example, of paper, rayon or other cellulose, nylons, polyesters, polyolefins, vinyl polymers, polyurethanes and the like, or mixtures of the aforesaid or similar materials. Such sheets may comprise creped, flat, woven or non-woven materials and may be provided in the form of single or multi-ply tissues, towellettes, or the like. Wet sheets having the foregoing described characteristics will hereinafter be referred to as "wet sheets as hereinbefore defined".

By "popping-up" or "pop-up" of the substantially wet sheets is meant the automatic presentation of each successive wet sheet for readily accessible manual grasping and withdrawal, upon removal of each preceding wet sheet. Utilizing the dispenser of the present invention, which includes a barrier member having a sheet restricting opening through which each of the successive wet sheets must be dispensed, such sheets are considered to pop-up when at least about one-half inch, and preferably at least about one inch, of each successive wet sheet is thus presented through the restricted opening, thereby facilitating ready

manual grasping thereof.

Wetted tissues, towlettes or the like have, in recent years, achieved substantial consumer acceptance. By and large, products of this nature have taken the form of individual units, each sheet being folded into a compact shape and sealed within an impermeable foil or plastics package (see, for example, Williams United States Patent No. 3,057,467 granted on October 9, 1962. To permit use, the outer package must be opened, and the individual sheet removed and unfolded. For a number of reasons, including the relatively substantial cost of such individually wrapped wet sheets and the relative inconvenience of removing and unfolding the sheets from the individual packages, these individual unit packages have not been widely adopted for many purposes for which they might otherwise be suitable.

The need for more convenient commercial forms of pre-wetted tissues or towlettes has not been ignored, a number of prior workers having proposed products for the bulk packaging and individual dispensing of such wet sheets. Bulk packages so proposed have utilized either rolls of wet sheets defined, for example, by perforations in a suitable web stock, or stacks of wetted sheets pre-folded to facilitate dispensing. Roll dispensers for this purpose are disclosed, for example, in Cordis United States Patents Nos. 3,310,353 and 3,365,522 granted March 21, 1967 and February 13, 1968, respectively. Such dispensers provide for pre-wetting the web constituting the successive sheets to be dispensed, pulling the web from the outer periphery of the roll from which it is supplied, and shearing the successive sheets from the web by means of associated cutting edges.

Sheets dispensed from such roll dispensers may, as indicated by Cordis, require longitudinal and/or transverse reinforcing strips to impart sufficient strength to the wetted sheets; in the absence of such reinforcements the wet sheets may not be cleanly sheared and may rather tear unevenly. Moreover, the necessity to rotate the supply roll during dispensing may lead (particularly when the roll itself is wetted) either to tearing of the web or require the use of a paper so strong as to resist sheet separation and impose possible chaining problems.

French Patent No. 2,061,000 published on June 18, 1971 describes another roll dispenser for the individual dispensing of wet sheets. The product described in this patent incorporates a continuous perforated roll disposed within a cylindrical container, the individual sheets being unwound or un-

pulled lengthwise of the container in a rope-like web, and being torn at the perforations as they are withdrawn through a small slit in an end wall of the container. It has been found that individual sheets may not uniformly separate from one another employing this type of bulk dispenser. To the contrary, in some instances deleterious chaining of a number of the wet sheets occurs resulting in dispensing of a coiled or twisted "rope", while in others sheets catch in the dispensing slit, and tear. Further, it is relatively difficult to thread the leading edges of the inside of the roll through the slitted end wall of the container without twisting and possibly snarling the same.

Moreover, it is necessary to provide a large axial free space within the roll-type dispenser of the French patent in order to facilitate uncoiling and feeding of the wet sheet web therethrough. In addition to thus imposing increased product dimensions, the presence of such a dead space permits collapse of the walls of the wet roll during shipment or storage and may necessitate re-shaping the roll to permit uncoiling and withdrawal of the rope-like web for ultimate use.

The roll-type dispensers described in the Cordis patents and in the aforesaid French patent suffer from the further disadvantage that, unlike products incorporating stacks of the wet sheets to be successively dispensed, a group of sheets may not be separated from the roll for separate dispensing. Stacks, on the other hand, may be readily sub-divided and groups of the wet sheets comprising the same used for travel packs or the like.

In view of these apparent advantages products for successively dispensing wet sheets from a stack of such sheets have also been proposed in the art. One such device is illustrated as a further embodiment (Figure 4) in the aforesaid Cordis patents. In that dispenser the stack of sheets is maintained within a chamber supported on a spring-loaded follower plate and biased in the opposing direction by a pair of finger-like depressors mounted on the dispenser cover. Upon successive opening and closing of the cover the pressure exerted on the stack by the depressor fingers is varied for the purpose of facilitating manually grasping and withdrawing the successive sheets from the stack.

The Cordis stack dispenser is, however, relatively complex mechanically, involving the application of a number of independent forces produced by the spring-loaded follower and the separate depressor fingers. When the pressures produced by these members are sufficient to separate sheets at the top of a full stack, they may not be

sufficient to effect separation between the last few sheets in the stack. On the other hand, when the pressures are adequate to effect separation between sheets at the bottom of a stack, they may be so great as to tear the sheets or even prevent dispensing of the first several sheets of such a stack. Yet further, the application of such pressures limits the liquid contents of the sheets dispensed, the follower plate and the depressor fingers tending to squeeze the liquid from the sheets.

Moreover, the individual sheets of the Cordis stacks are not separated from one another to facilitate independent and successive dispensing thereof. To the contrary, since the individual sheets do not "pop-up" in sequence, the wet sheets may stick together, necessitating substantial manual dexterity to avoid grasping two or more sheets simultaneously. Also, the pressures applied to the Cordis stack of wet tissues coupled with the apparent tilting of the follower plate supporting the same may result in the escape of substantial amounts of liquid from the stack to the base of the dispenser housing. The presence of such free liquid plus the notch opening permanently provided in the container pose substantial limitations on both the useful life and the portability of the Cordis product.

Another bulk package for dispensing stacked wet sheets is disclosed in Rockefeller United States Patent No. 3,499,575 granted on March 10, 1970. In the dispenser embodiment described in this patent, non-interleaved sheets are dispensed from a stack placed within a tray having a supporting ridge so disposed that the edge of each succeeding sheet may be grasped after removal of the prior sheet. Like Cordis, Rockefeller has sought to rely on the application of a distorting force (the supporting ridge) to facilitate the separation of the leading edges only of each successive sheet. Moreover, also like Cordis the Rockefeller dispenser does not provide individual sheets which "pop-up" upon removal of the prior sheet, thus hampering read manual grasping of each individual wet sheet to be successively dispensed.

The Rockefeller type dispenser enables the user to grasp only the leading edge of each succeeding sheet; at certain wetness ranges other areas of adjacent sheets adhere to one another with dispensing of more than one sheet at a time. In addition, as the wet sheets are removed from the Rockefeller stack the user must insert his fingers into the container to attempt to separate each successive individual sheet. It may be seen that increasing dexterity is thus required, particularly in the removal of the last several sheets from the stack.

The bulk packaging in stack form of dry sheets or tissues is, of course, also known. Sheets so packaged may be inter-folded so as to successively "pop-up" upon dispensing of each prior sheet or tissue. Dry tissue dispensers of this type are legion in the patent art and are embodied in most commercial cleaning or facial tissue dispensers.

It should be noted that while prior workers have recognized the need for the bulk packaging and individual dispensing of wetted sheets and suggested several products for this purpose, they have avoided adopting the expedients previously utilized in the dry tissue art for individually dispensing dry sheets or tissues. Indeed, the very failure of those in the wet sheet dispensing art to attempt to utilize techniques employed for dispensing dry tissues is indicative of the distant problems encountered in the bulk packaging and individual dispensing of wet sheets as distinguished from dry sheets. This is the case since the liquid films formed between inter-folded wet sheets create substantial adhesion between the adjacent sheets while, on the other hand, dry inter-folded sheets may be readily separated from one another by the force of gravity alone. Hence, chaining of adjacent sheets is a major problem in the individual dispensing of wetted sheets but is insignificant in regard to the dispensing of dry sheets.

Further, the use of dispensing or control elements or inserts to insure and maintain "pop-up" of each successive tissue withdrawn from a dry tissue dispenser is consistent with the preceding explanation regarding the gravity separation of dry tissues. The basic purpose of such inserts is to increase the frictional engagement between successive tissues withdrawn from the dispenser in order that the first such tissue draws the next tissue with it through the container opening and prevents the latter from falling back into the container or carton. With wet tissues, on the other hand, there is no need to increase adhesion between the successive wet sheets to insure "pop-up"; to the contrary the problem is to overcome adhesion between the successive sheets to facilitate sequential dispensing thereof, without tearing any of the individual sheets. Thus, the "floating" inserts employed in many dry tissue dispensers are not designed to separate strongly adherent sheet materials. On the other hand, the biasing of dry stacked sheets against fixed dispensing inserts has also been suggested in the patent literature; the pressures thus produced would, however, impair the separation and sequential pop-up and dispensing of strongly adherent, wetted sheets from stacks thereof.

The dispensing of dry sheets from stacks thus does not take into account the essential balancing of forces necessary for the sequential, independent pop-up and dispensing of wetted stacked sheets.

The dispensing of tissues or other sheets which have been merely impregnated with an aromatic or other odoriferous material presents the same problems associated with the dispensing of dry sheets, as distinguished from wet sheets as defined herein. One example of a previously proposed product for the bulk packaging and individual dispensing of tissues which have been so impregnated with an aromatic or medicated material is described in Bilezerian United States Patent No. 3,325,003 granted June 13, 1967. It has been found, however, that sheets or tissues impregnated in the manner described in the Bilezerian patent contain less than about 20% moisture by weight and act like dry tissues, individual inter-folded sheets separating readily, without chaining, due to the weight of the individual sheets alone.

In duplicating the Bilezerian work, stacks of inter-folded paper sheets of an absorbent paper toweling stock were impregnated with spirits of turpentine, nutmeg oil, oil of eucalyptus, oil of cedar wood, or spirits of ammonia, and the thus impregnated materials were wrapped in impervious sheets, aluminum foil and polyethylene being chosen as illustrative in the manner disclosed in the patent. After wrapping, the resulting packs were allowed to equilibrate for four days to permit the respective impregnants to penetrate the individual sheets. The packs were then opened and the top sheet pulled from each stack. In each instance the several sheets were substantially dry upon opening the pack. Further, in each instance save one the top sheet separated immediately without chaining. In the one exception (employing spirits of ammonia as the impregnating material), the first few sheets of the stacks stuck slightly together, probably due to hydrogen bonding between the sheets as they dried.

On the other hand, when a stack of the same towelettes was impregnated with about 200% by weight of an aqueous medium and packaged and stored as aforesaid, the substantially wet sheets remaining in the pack could not be separated by gravity alone, the sheets chaining when it was attempted to lift the top sheet only of the inter-folded stack.

It may thus be seen that the materials described in the Bilezerian patent operate in the same manner as the dry tissue stacks previously known in the art, and are not subject to the chaining problem involved in the individual, sequential dis-

persing of wet sheets from stacks incorporating the same.

The distinct forces affecting the individual dispensing of stacked wet sheets as contrasted with dry sheets are illustrated in Figure 1 of the attached drawings. That figure shows three plots of the shear forces required to separate different sheets from stacks as a function of the moisture contents of the respective sheets. The forces plotted correspond to the surface tension forces postulated between the respective sheets of the test stacks.

In the experimental work recorded in Figure 1, sheets of first, an absorbent, high wet strength paper toweling stock and second, a non-woven, random laid cellulosic material were impregnated with water or mineral oil at varying moisture levels. Pairs of the several sheets interfolded about their respective center lines (in a single or "V" fold) were placed in an Instron (Registered Trade Mark) tester and the shear forces required to separate the sheets were determined at the various moisture levels. The shear forces were then plotted against the moisture contents.

As shown in Figure 1, the forces required to shear two water-wetted sheets of the absorbent paper toweling (curve 10) increased from virtually zero at water contents of up to about 140% to a maximum of about 1000 grams at about 200%, and remained above 250 grams at water contents of up to about 300%. Impregnation of the same sheet material with mineral oil (curve 11) increased slippage between the respective sheets and thus decreased the required shearing forces. Nevertheless, wetting of the sheets increased the force necessary to effect shear (and thus to overcome chaining) from virtually zero to about 80% mineral oil content to about 200 grams at about 125% mineral oil. Finally, similar results were obtained employing the water-wetted non-woven cellulosic sheets (curve 12). In this instance, it was not possible to obtain zero shear force readings since, due to the poor wettability of such sheets, it was necessary to maintain the sheets under pressure at low moisture levels in order to spread the water across the sheet surfaces.

In each instance it may be seen that the shear force necessary to separate the wetted sheets, whether composed of toweling stock or the non-woven cellulosic fabric and whether wetted with water or with mineral oil, increased rapidly and markedly as the sheet liquid content was increased, reached a maximum, and decreased as the liquid content became so great that excess liquid formed layers or pools between the wetted sheets. From the curves plotted it is apparent that the forces between successive

sheets of a bulk packaged stack differ in kind when the sheets are substantially wet rather than dry.

It is among the objects of the present invention to provide for the improved bulk packaging and individual dispensing of such wet, stacked sheets from a package which is both simple and economical to manufacture, and which is so designed that it may be utilized for the successive dispensing of the individual wet sheets without chaining, notwithstanding the substantial adhesive forces created between the sheets within the stack. Other objects and advantages of the invention will be apparent from the following description of preferred forms thereof.

According to the invention there is provided a bulk package for individually dispensing substantially wet sheets from a stack of such sheets, which comprises a stack of inter-engaged substantially wet sheets as hereinbefore defined, and a container receiving the stack of wet sheets and having a cover having means for forming a substantially moisture-proof seal between the container and the atmosphere, the package being characterized by a barrier disposed within the container, overlying the stack of wet sheets and having:

(a) a sheet restricting opening therein through which the wet sheets may be individually and successively removed when the cover is opened, and including

(b) frictionally engaging means proximate said opening for contacting the adjacent surfaces of the successive sheets withdrawn from the stack such that when the sheet adjacent the barrier is pulled outwardly of the package the leading surfaces of the next succeeding sheet are drawn by and in contact with the sheet adjacent the barrier through the opening into contact with said frictionally engaging means which means produce a frictional force on the next succeeding sheet sufficient to overcome the force resisting separation of the two sheets yet not so large that the force required to remove the sheet adjacent the barrier will tear either of such sheets, said frictionally engaging means effecting separation of the sheets with the leading surfaces of the next succeeding sheet extending outwardly of the opening positioned for subsequent manual grasping and removal from the package.

The barrier member may comprise an insert normally disposed at a fixed position within the container and hence according to a further aspect of the invention there is provided a bulk package for individually dispensing substantially wet sheets from a stack of such sheets, including the stack of interengaged substantially wet sheets as hereinbefore defined and a container re-

movably receiving said stack and having a cover incorporating means for forming a substantially moisture-proof seal between the interior of the container and the atmosphere, and a barrier overlying the stack of wet sheets and having a sheet restricting opening therein through which the wet sheets may be individually and successively removed when the cover is opened, the package being characterized in that:

(a) said container and said barrier comprise separate plastics members;

(b) said barrier comprises a substantially planar insert normally disposed at a fixed position within the container spaced from the uppermost sheet in said stack of wet sheets but so movable with respect to said fixed position to permit access to the interior of the container, and said insert has

(i) a generally diamond-shaped aperture defining said sheet restricting opening and being disposed in overlying relation with respect to the faces of the respective superposed wet sheets in the stack, said aperture having a major axis generally aligned with and shorter than the width of said sheets and a minor axis generally aligned with the length of said sheets.

(ii) sheet engaging surface means defined adjacent said aperture for frictionally engaging the successive sheets removed therethrough with forces sufficient to overcome the forces resisting separating of the successive wet sheets yet no so large that the force required to remove each successive wet sheet from the stack will tear any of the sheets or remove the insert from the container.

(iii) at least a pair of spaced detents integral with and disposed on opposite sides of said insert, and

(iv) pairs of oppositely disposed elongated front and rear and side ribs formed integrally with said insert;

(c) said container includes

(i) at least a pair of recesses formed in the upstanding walls thereof and aligned with said detents for receiving and engaging the same,

(ii) posts integrally formed with and extending lengthwise of the juncture of the adjacent walls of said container and having upper, substantially planar surfaces defining a supporting plane for positioning said insert at said fixed position, and

(iii) a plurality of locking detents integrally formed on the walls of the container for engaging said cover; and

(d) said cover includes

(i) a flexible plastics hinge integral with said cover and said container for mounting the former to the latter,

(ii) sealing surfaces for forming a seal with the container when the cover is in its

closed position, and

(iii) a plurality of locking detents integrally formed on said cover, aligned with the locking detents on said container for engaging the latter when the cover is in its closed position and holding the cover in such position to maintain the substantially moisture-proof seal between the interior of the container and the atmosphere; and the detents on said insert and the recesses and posts in said container support and maintain the insert at said fixed position within the container when the successive sheets are removed therefrom through said sheet restricting opening yet permit manual removal of the insert from the container for access to the interior thereof.

There is thus provided a relatively simple yet efficient structure for removably and replaceably storing and individually and sequentially dispensing the successive wet sheets in "pop-up" fashion without chaining. The successive sheets are dispensed in form for easy manual grasping and are ready for use as removed from the package without having to be unfolded or untwisted, as in the case of previously disclosed wet sheet dispensers. Operation of the dispenser is such that, in fact, at least about one-half inch, and preferably at least about one inch, of each successive wet sheet is presented through the restricting opening in the barrier for readily accessible individual manual grasping and removal. Further, by interposing the barrier between the manually graspable portion of the uppermost sheet and the succeeding wet sheets in the stack, easy manual grasping of a single wet sheet is assured as contrasted with the substantial manual dexterity required to dispense individual wet sheets from the prior art stack dispensers.

Surprisingly, wet sheets removed from the dispenser hereof not only retain their liquid contents but, it has been found, actually possess increasing liquid contents down through the stacks from which they are dispensed.

When the container barrier is provided in the form of a displaceable insert, the supporting and mounting means therefor perform a unique set of functions, serving both to maintain the barrier in operative relation to the stack of wet sheets and yet permitting manual removal of the insert for refill or like purposes. On the one hand, the forces exerted upon removal of the successive sheets through the sheet restricting opening create both unidirectional and torsional forces on the insert, which must be balanced to maintain the insert in its operative position. On the other hand, the insert must be so mounted that it can be frequently manually displaced or removed from the container by the average

user without adversely permanently stressing the container walls and thus materially decreasing the useful life of the product. Since frequent displacement or removal of the insert may tend to bend the container walls outwardly or otherwise alter or deform the engaging surfaces of the insert and the container, it is important that the cooperating supporting and mounting means be so designed as to effect this conflicting set of functions.

The dispenser hereof may be provided in any suitable size or configuration for industrial, home, purse or pocket use. If desired, portions of the stacks of wetted sheets used in such dispensers may be removed therefrom for use in smaller bulk dispensers, e.g. for pocket or travel packs. Refill stacks of wet sheets mounted, for example, in a tub-like enclosure and sealed with moisture impermeable, removable foil packaging, may be readily adapted for use with the indicated dispensers for repeated and prolonged use.

The invention will be more fully understood when considered in connection with the preferred embodiments described hereinafter in connection with the accompanying drawings in which:

Figure 1, as indicated hereinabove, is a graph illustrating the relationship of the adhesive forces between successive stacked inter-folded sheets as a function of the moisture contents thereof;

Figure 2 is a stress-strain curve diagrammatically illustrating the typical forces acting on a pair of wet sheets successively dispensed from a preferred embodiment of the bulk package of the present invention;

Figure 3 is a perspective view of the preferred embodiment of the invention, showing the dispenser insert in assembled relation with the leading edges of a topmost wet sheet extending through the restricting opening thereof, and the walls of the container being partially cut away to show the stack of wet sheets therein;

Figures 4A-4C show, in partial, diagrammatic cross-section, three sequential stages of the removal of two successive wet sheets from the stack incorporated in the bulk package illustrated;

Figure 5 is a further perspective view of the preferred bulk package embodiment, with the cover shown in its closed position;

Figure 6 is a perspective view similar to Figure 3 but showing the container with the stack of wet sheets removed, and the dispenser insert in exploded relation to indicate the internal structure of the container; and

Figure 7 is an enlarged partial vertical section taken along the line 7-7 in Figure 5, showing details of the dispenser insert and cover;

Figure 7A is a detail view showing the detent system securing the dispenser insert within the container as shown in Figure 7; and

5 Figures 8 and 9 are further enlarged partial vertical sections, taken along lines 8-8 and 9-9, respectively, of Figure 5, and showing details of the dispenser insert, cover, and hinge structures.

10 Referring to the drawings, and with initial reference to Figures 3 and 6 in particular, the preferred embodiment of the bulk package illustrated comprises a stack 13 of substantially wet sheets removably and replaceably stored in and dispensed from a container shown generally at 14. The container is provided in the form of a box-shaped member prepared, for example, by moulding or vacuum forming of a suitable plastics, e.g., polypropylene, or from a similar substantially moisture resistant and impermeable material. The container incorporates a cover 15 and has a barrier member or dispenser insert 16 overlying the stack and disposed between the stack and the cover. As discussed more fully below, a sheet restricting aperture or opening 17 is defined in the insert 16. The individual edges and corners of the opening and the surfaces proximate thereto provide frictionally engaging means effecting separation of the substantially wet sheets and facilitating "pop-up" of each successive sheet as it is withdrawn from container 14.

35 The individual sheets 18 within stack 13 may, as indicated hereinabove, comprise any suitable sheet material capable of absorbing and/or adsorbing the bulk of the liquid impregnant utilized. The choice of the particular sheet material is related to the configuration and dimensions of the restricting opening 17 through which the sheets are successively removed from the bulk package, the composition of the impregnant, and the desired end use of the product. The liquid composition will, of course, also depend on the particular purpose for which the wetted sheets are to be used and may include water, mineral oil (for a baby lotion, for example), detergents or soaps, perfumes, surfactants, deodorants, or any other ingredients to be utilized for the particular cleansing, cosmetic or like application involved. When, for example, it is desired to market the dispenser as a source of vaginal cleansing towelettes, the wet sheets may suitably be constituted of an absorbent paper toweling stock having a wet tensile strength of at least about 0.5 lb./inch, preferably at least about 1.0 to 1.5 lbs./inch, of width in the direction of dispensing, impregnated with a substantially aqueous medium incorporating 65 deodorants, bacterial and mold growth in-

hibitors, perfume, and the like in minor proportions.

The stack 13 comprises a plurality of sheets 18, the faces F of which are arranged in substantial parallelism. Preferably, the individual sheets are inter-folded or inter-leaved with one another, the use of alternating "V" folds about the center lines of the respective inter-folded sheets being illustrated in the preferred form (Figures 3 and 4). Alternatively, the sheets may be otherwise inter-leaved (e.g., in a double or "Z" fold) in order that withdrawal of any sheet from container 14 through opening 17 draws the leading edges of the succeeding sheet through such opening. In yet a further embodiment, the stack of sheets may comprise a continuous zigzag strip so perforated that the individual sheets separate upon being withdrawn through the restricting opening. From the preceding it should be apparent that the particular manner of inter-folding or interleaving the successive wet sheets within the bulk package hereof is not a critical element of the present invention and providing the sheets are interengaged may be varied as desired.

The sheet restricting opening 17 in insert 16 is juxtaposed with the face F of the uppermost sheet 18a of the stack, disposed substantially parallel to such face and the corresponding faces or extended portions of the other sheets in the stack. In the preferred embodiment illustrated, the opening is defined by a generally diamond-shaped cut-out having a major axis X generally aligned with but shorter than the width of the sheets 18 (that dimension of the sheets which is presented to and constricted by the sheet restricting opening as each sheet is withdrawn therethrough) and a minor axis Y generally aligned with the length of the sheets (or, more particularly, the lengths of the two or more folded sections of each sheet defined within the stack).

When the uppermost sheet is pulled outwardly of the dispenser the leading surfaces to the next succeeding sheet are in contact with the first sheet and are drawn thereby through the restricting opening 17 into frictional contact with one or more of the substantially unyielding (i.e., frictionally engaging) edges and corners 19a-f defined by the walls of the insert. These surfaces comprise sheet engaging surfaces which produce a frictional force on the next succeeding sheet sufficient to overcome the force resisting separation of the two sheets yet not so large that the force required to remove the first sheet will tear either such sheet or remove the dispenser insert 16 from the container. Separation of the successive sheets is thus effected with the leading surfaces of the second sheet extending outwardly of opening 17 positioned

for convenient manual grasping and removal from the package. It may be seen from the preceding that the leading surfaces of each successive sheet thus "pop-up" extending outwardly of the container for ready grasping. It is not necessary for the user to insert his fingers into the container (as required, for example, in use of the Cordis and Rockefeller stack dispensers referred to hereinabove) to remove the sheets from the stack. On the other hand, the restricting opening is large enough to permit insertion of one's finger for withdrawing the uppermost sheet of a new stack, for example.

In one preferred embodiment of the present invention the dispenser insert 16 is so constructed and mounted at a fixed position within container 14 that it is not removed from the container upon application of the forces necessary to withdraw the successive sheets therefrom, yet at the same time is manually displaceable or removable to obtain access to the interior of the container, e.g., for removal or replacement of all or a portion of the stack of wet sheets therein. For this purpose the dispenser insert is provided in the form of a tray-like member, e.g., of a molded plastics, incorporating front and rear elongated ribs 21 and corresponding elongated side ribs 22. Ribs 21 and 22 serve to stiffen the thin insert, the resulting relatively rigid member not distorting when the sheets are pulled therethrough and thus resisting displacement thereby. The provision of such ribs provides greater latitude in the choice of the thickness and configuration of insert 16 adjacent sheet restricting opening 17, thus facilitating design of the frictionally engaging surfaces which effect pop-up dispensing of the successive wet sheets from the stack.

A pair of spaced detents 23 defining mounting means are formed integrally with each side rib 22, the respective detents having tapering cross-sections (see Figures 7 and 7A) adapted to be received in and frictionally engage corresponding recesses 24 separated by intermediate reinforcing wall sections or septums 30 of the adjacent container walls 20. By disposing the detents and recesses centrally of the sides of the insert and the side walls of the container, removal of the insert is facilitated; this is the case since the central portions of the container side walls 20 may be manually bowed outwardly to the greatest degree thereby simplifying disengagement of the insert-container detent system when it is desired to remove the insert from the container.

A pair of spaced detents 23a and b is utilized rather than a single broader detent member, the pair of mating spaced recesses

receiving the detents minimizing if not preventing permanent distortion of the container side walls 20 after prolonged use and consequent repeated removal and replacement of the insert in the dispenser. In the absence of the intermediate reinforcing wall or septum 30 between the spaced recesses 24a and b the container walls may crease and acquire a permanent deformation after prolonged use, ultimately weakening the locking engagement produced between insert 16 and container 14 by the detent system. Further, the provision of detents 23 having tapering or wedge-shaped cross-sections promotes the positive engagement between the dispenser insert and the container therefor. Hence, when the insert is placed in the container the detents act as camming surfaces and assist in seating the same within the mating recesses. When, on the other hand, the detents have been seated in the recesses the outward tapers of the detents aid in maintaining the detent system in operative engagement resisting both the torsional forces tending to push one side of the insert into the container as well as the outward unidirectional forces tending to remove the insert from the container during withdrawal of the successive wet sheets through the sheet restricting opening therein.

The detent system thus firmly and removably mounts and supports the insert 16 within the container 14 and retains the insert therein, notwithstanding the fact that the removal forces manually exerted on the wet sheets act on the insert as well, and the further fact that, after repeated removal with prolonged use, the container side walls may bow outwardly somewhat.

Molded columns or posts 25 are additionally formed integrally with and along the junctures of the adjoining walls of container 14; the plural posts 25, four of which are provided in the disclosed embodiment, terminate in upper surfaces or ledges 26 which define a substantially horizontal supporting surface for the dispenser insert 16. The supporting surface so provided, together with the spaced detent-recess members 23-24 locking the insert in place, resist the torsional forces acting upon the insert during wet sheet withdrawal therethrough, and maintain the same in its operative relation. The insert is thus positioned, resting on the ledges 26 and interlocked with the container housing by means of the mating detents 23 and recesses 24 at the opposite side surfaces thereof, with the posts 25 and recesses 24 formed in the container providing supporting means for the insert.

It will be noted that the mounting and supporting means described for insert 16

secure the same at a fixed position, spaced a distance L (see Figure 4A) from the uppermost of the sheets 18 in the stack 13. By thus mounting the insert in spaced relation from the stack the successive inter-folded sheets may curl upon one another in the manner described hereinafter as they are successively withdrawn through the sheet restricting opening 17 to provide the desired pop-up dispensing. The spaced relation between the insert and the uppermost sheet in the stack is important to insure independent sequential dispensing of the several sheets; were, on the other hand, insert 16 to be disposed in contact with the uppermost sheet of the stack, it would be difficult, if not impossible, to remove such sheet without either tearing the same or producing chaining.

The cover 15, which may suitably comprise the same material as container 14, is secured to the body of the container by means of a flexible plastics hinge element 27 (Figures 6, 9). The use of such a hinge is preferred since it provides a relatively simple, integral linkage for securing the cover to the container in such a manner that a substantially moisture-proof or impervious seal may be readily and efficiently created therebetween upon closing the cover.

The cover itself includes circumferentially extending wall portions 28 having interior shoulder elements 29 extending along all but the hinged side thereof. The shouldered wall portions 28 cooperate with and engage upstanding wall elements 31 formed integrally with the container body.

A plurality of detents 32 (three are shown in Figure 6) are formed integrally along the front wall portion 28a of cover 15, adapted to fit over and cooperatively engage mating detents 33 formed on the corresponding front wall element 31a of the container body. By pressing the cover into engagement with the container with the detents 32 of the cover extending below and frictionally engaging the detents 33 of the container walls (Figure 3), the respective wall sections 28 and 31 provide a substantially moisture-impervious sealing means (Figure 7) between the container and the atmosphere. A further external ridge 34 may also be provided extending along the outer, front edge of cover 15 to facilitate manual opening of the cover.

The mechanism of operation of the dispenser may be more fully understood in the light of the several stages involved in sequentially dispensing three successive wet sheets therefrom, which stages are illustrated in Figures 4A-4C and the approximate stress-strain relationship characteristic of which is plotted in Figure 2. In-

itially, the stack 13 is impregnated with the desired treatment liquid, either prior to placing the stack within the container, or directly within the container.

Preferably, employing an absorbent paper toweling stock for the wetted sheets, water as the treatment liquid, and utilizing an inter-folded stack of "V"-folded sheets as illustrative, the uppermost wet sheet 18a is withdrawn from container 14 by drawing the leading edges thereof through the sheet restricting opening 17, the adjacent surfaces of the wet sheet frictionally engaging edges 19a and b and corners 19e and f adjacent the opening as the sheet is drawn therethrough. As wet sheet 18a is drawn from the container it pulls with it the inter-folded leading portion of the succeeding sheet 18b (Figures 4A and B). The leading edges of sheet 18b are thus drawn through the sheet restricting opening (Figure 4B), ultimately engaging the opposite edges 19c and d and corners 19e and f adjacent the opening. As the withdrawal of sheet 18a is completed, the frictional drag exerted on sheet 18b by these edges and corners effects separation of the two sheets and facilitates independent removal of sheet 18a from the container without chaining.

When sheet 18b is similarly manually drawn from the container it pulls the leading surfaces of sheet 18c through the opening (Figure 4C). The frictional drag imposed on sheet 18c by edges 19a and b and corners 19e and f facilitates separation and removal of sheet 18b without chaining with the succeeding sheet 18c. Sheet 18c may thereafter be withdrawn and the operation repeated to effect withdrawal, separation and removal of each succeeding wet sheet in the manner shown in the successive stages of Figure 4.

The forces required to thus sequentially withdraw the wet sheets from the dispenser are plotted by way of illustration in Figure 2. Initially, as the first sheet 18a is drawn through the dispenser insert (see also Figure 4A) the force required for withdrawal increases rapidly to a first force F_1 (the force required to remove a single sheet through opening 17) which may, typically, be of the order of 350-400 grams. As the second wet sheet 18b approaches opening 17 the withdrawal force starts to rise rapidly, the second sheet doubling back or curling on itself (see Figure 4B) as it is drawn through the opening in frictional engagement with edges 19c and d and corners 19e and f. This second force F_2 (the force required to pull the two sheets simultaneously through opening 17 without tearing the sheets or pulling insert 16 out of the container) reaches a maximum just as sheet 18b is most tightly doubled back on itself. Employing the preferred system de-

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scribed herein, the maximum force is about 850 grams; F_3 may, however, vary from as low as about 500 grams to as much as about 1100 grams in the same system, depending upon the spacing of the uppermost sheet in the stack from insert 16 (and, consequently, the amount and degree of resistance created by curling of each succeeding sheet on itself).

The removal force necessary then drops off as sheet 18b is uncoiled and both sheets 18a and 18b pass simultaneously through the sheet restricting opening 17 until that point at which the first wet sheet is dispensed. Just prior to that point, the removal force F_3 (the force exerted at the point 18a is sheared from the sheet 18b) must exceed the frictional force between the respective sheets (that force tending to produce chaining within the system).

In one particularly preferred embodiment of the bulk package of the invention, container 14 may be about 5 inches long by about 2-1/2 inches deep by about 2 inches high. The dispenser insert may have a thickness of about 1/16 inch, and the diamond-shaped restricting opening therein may be centered and have rounded corners, the length of each leg of the diamond being about 1-3/8 inches, and the major and minor axes X and Y of the diamond (Figure 6) being about 2-1/2 and 1-1/2 inches long, respectively. The wet sheets may comprise the above-identified absorbent paper toweling stock having a wet tensile strength in the dispensing direction of from about 1.5 to 3.0 lbs/inch of width. They may be rectangular in shape, about 4-1/2 inches by 4-1/2 inches and inter-folded about their respective center lines, and may be arranged in a stack of about 100 such sheets, approximately 1-1/2 inches high. The sheets may be wetted by charging the container, with the stack therein, with a substantially aqueous solution containing minor amounts of emollients, detergents, bacterial and mold growth inhibitors, perfume additives and the like, as indicated hereinabove.

The noted structures, dimensions and compositions refer to details of the specific embodiment described herein above and shown in the attached drawings, and are not intended as limiting. Thus, for example, the container 14 may be modified to incorporate a separate cover which need not be hinged to the container in the manner of cover 15 but which may merely engage the container by means of interlocking detents, rims or the like to form the desired substantially moisture-proof seal, and be readily and entirely removable therefrom.

In a further embodiment, the insert member 16 may be displaceable

yet not entirely removable from the container; for example, the insert may be hinged to the container in the same manner as the cover 15 and may pivot about the hinge to permit access to the interior of the container for removal or replacement of all or a portion of the stack of wet sheets. The insert may thus, in effect, provide an inner, apertured cover for the container. Alternatively, the barrier member need not be a removable or replaceable insert, but may be permanently mounted and all or a portion of the stack of wet sheets removed or replaced through an appropriate opening in the base or a side wall of the container.

Since these and other changes may be made in the preferred embodiment of the bulk package and dispenser hereof without departing from the scope of the invention, and since the invention is not restricted to the mechanisms postulated hereinabove, it is intended that the preceding description should be construed as illustrative and not in a limiting sense.

WHAT WE CLAIM IS:—

1. A bulk package for individually dispensing substantially wet sheets from a stack of such sheets, which comprises a stack of interengaged substantially wet sheets, as hereinbefore defined, and a container receiving the stack of wet sheets and having a cover having means for forming a substantially moisture-proof seal between the container and the atmosphere, the package being characterized by a barrier disposed within the container, overlying the stack of wet sheets and having

(a) a sheet restricting opening therein through which the wet sheets may be individually and successively removed when the cover is opened, and including

(b) frictionally engaging means proximate said opening for contacting the adjacent surfaces of the successive sheets withdrawn from the stack such that when the sheet adjacent the barrier is pulled outwardly of the package the leading surfaces of the next succeeding sheet are drawn by and in contact with the sheet adjacent the barrier through the opening into contact with said frictionally engaging means which means produce a frictional force on the next succeeding sheet sufficient to overcome the force resisting separation of the two sheets yet not so large that the force required to remove the sheet adjacent the barrier will tear either of such sheets, said frictionally engaging means effecting separation of the sheets with the leading surfaces of the next succeeding sheet extending outwardly of the opening positioned for subsequent manual grasping and removal from the package.

2. The bulk package of claim 1,

characterised in that the barrier opening is juxtaposed with the face of the uppermost sheet in the stack.

3. The bulk package of claim 1, characterized in that the stack comprises a plurality of inter-folded wet sheets, the uppermost sheet of which is so inter-folded with respect to the successive wet sheet in the stack that withdrawal of said uppermost sheet effects partial withdrawal of said successive sheet through the restricting opening with the leading edges of said successive sheet extending outwardly of the opening presented for manual grasping and withdrawal.

4. The bulk package of claim 3, characterized in that the stack comprises a plurality of individual sheets which are inter-folded as aforesaid.

5. The bulk package of claim 1, characterized in that the barrier comprises a substantially rigid member having an opening which is restricted with respect to the dimension of the sheets presented thereto as the sheets are successively withdrawn therethrough.

6. The bulk package of claim 1, characterized in that the wet sheets in the stack have an average moisture content of at least 80% of their total weight.

7. The bulk package of claim 1, characterized in that the wet sheets are constituted of an absorbent cellulosic material and said sheets are wetted with an aqueous medium.

8. The bulk package of claim 1, characterized in that said container is formed of a plastics.

9. The bulk package of claim 1, characterized in that said barrier comprises an insert normally disposed at a fixed position within the container but so movable with respect to said fixed position to permit access to the interior of the container, and said insert includes

(i) a sheet restricting opening disposed in overlying relation with respect to the faces of the respective superposed wet sheets in the stack and defining sheet engaging surface means adjacent thereto for frictionally engaging the successive sheets removed therethrough with forces sufficient to overcome the forces resisting separation of the successive wet sheets yet not so large that the force required to remove each successive wet sheet from the stack will tear any of the sheets or displace the insert from said fixed position, and

(ii) mounting means on the insert adjacent the walls of the container; and said container has supporting means cooperating with said mounting means on the insert for supporting and maintaining the insert in said fixed position within the container when the successive sheets are removed

therefrom through said sheet restricting opening, and for disengaging from the mounting means on the insert when it is desired to manually displace the insert from said fixed position for access to the stack of wet sheets.

10. The bulk package of claim 9, characterized in that the supporting means on said container and the mounting means on said insert comprise cooperating detent means and recess means, and in which one of said container and said insert incorporates the detent means and the other of said container and said insert incorporates the recess means for removably securing the insert in said fixed position within the container.

11. The bulk package of claim 9, characterized in that the supporting means on said container comprises a number of ledges at a pre-selected height of the interior walls of the container, said ledges providing a substantially planar support for the insert and defining said fixed positions of the insert within the container spaced from the uppermost sheet of the stack of wet sheets.

12. The bulk package of claim 9, characterized in that the insert is a generally planar member having peripheral rib means extending transversely of the plane of the insert for imparting increased rigidity to the insert.

13. The bulk package of claim 9, characterized in that flexible hinge means are provided integral with said cover and said container for mounting the cover on the container, and cooperating sealing means and detent means are provided on each of the cover and the container, said hinge means, sealing means and detent means providing the substantially moisture-proof seal between the container and the atmosphere when the cover is in its closed position.

14. The bulk package of claim 9, further characterized by

(a) at least two spaced detents integral with and disposed on each of a pair of opposite sides of said insert,

(b) corresponding recesses formed in the walls of said container and aligned with said detents for receiving said detents and removably supporting said insert;

(c) a post integrally formed with and extending lengthwise of each pair of adjacent upstanding walls of the container and having an upper, substantially planar surface for further supporting said insert within the container; and

(d) pairs of oppositely disposed elongated front and rear and side ribs formed integrally with said insert for bearing against the adjacent surfaces of said container; said detents, recesses, posts and ribs

being cooperatively arranged for removably supporting and maintaining the insert at said fixed position within the container.

- 15 The bulk package of claim 14, characterized in that said detents are formed integrally with the respective side ribs of said insert, and in which each detent tapers upwardly and outwardly and terminates in a leading edge which is received in and engages the corresponding recess in the adjacent wall of said container.

- 16 The bulk package of claim 9, characterized in that the sheet restricting opening is defined by a generally diamond shaped aperture in said insert having a major axis substantially aligned with and shorter than the width of said sheets and a minor axis substantially aligned with the length of said sheets.

- 17 The bulk package of claim 9, characterized in that said container is plastics and said insert is a relatively rigid plastics member removable from the container.

- 18 A bulk package for individually dispensing substantially wet sheets from a stack of such sheets, including the stack of interengaged substantially wet sheets as hereinbefore defined and a container removably receiving said stack and having a cover incorporating means for forming a substantially moisture-proof seal between the interior of the container and the atmosphere, and a barrier overlying the stack of wet sheets and having a sheet restricting opening therein through which the wet sheets may be individually and successively removed when the cover is opened, the package being characterized in that:

- (a) said container and said barrier comprise separate plastics members;
(b) said barrier comprises a substantially planar insert normally disposed at a fixed position within the container spaced from the uppermost sheet in said stack of wet sheets but so movable with respect to said fixed position to permit access to the interior of the container, and said insert has

- (i) a generally diamond-shaped aperture defining said sheet restricting opening and being disposed in overlying relation with respect to the faces of the respective superposed wet sheets in the stack, said aperture having a major axis generally aligned with and shorter than the width of said sheets and a minor axis generally aligned with the length of said sheets,

- (ii) sheet engaging surface means defined adjacent said aperture for frictionally engaging the successive sheets removed

therethrough with forces sufficient to overcome the forces resisting separation of the successive wet sheets yet not so large that the force required to remove each successive wet sheet from the stack will tear any of the sheets or remove the insert from the container,

(iii) at least a pair of spaced detents integral with and disposed on opposite sides of said insert, and

(iv) pairs of oppositely disposed elongated front and rear and side ribs formed integrally with said insert;

(c) said container includes

(i) at least a pair of recesses formed in the upstanding walls thereof and aligned with said detents for receiving and engaging the same,

(ii) posts integrally formed with and extending lengthwise of the juncture of the adjacent walls of said container and having upper, substantially planar surfaces defining a supporting plane for positioning said insert at said fixed position, and

(iii) a plurality of locking detents integrally formed on the walls of the container for engaging said cover; and

(d) said cover includes

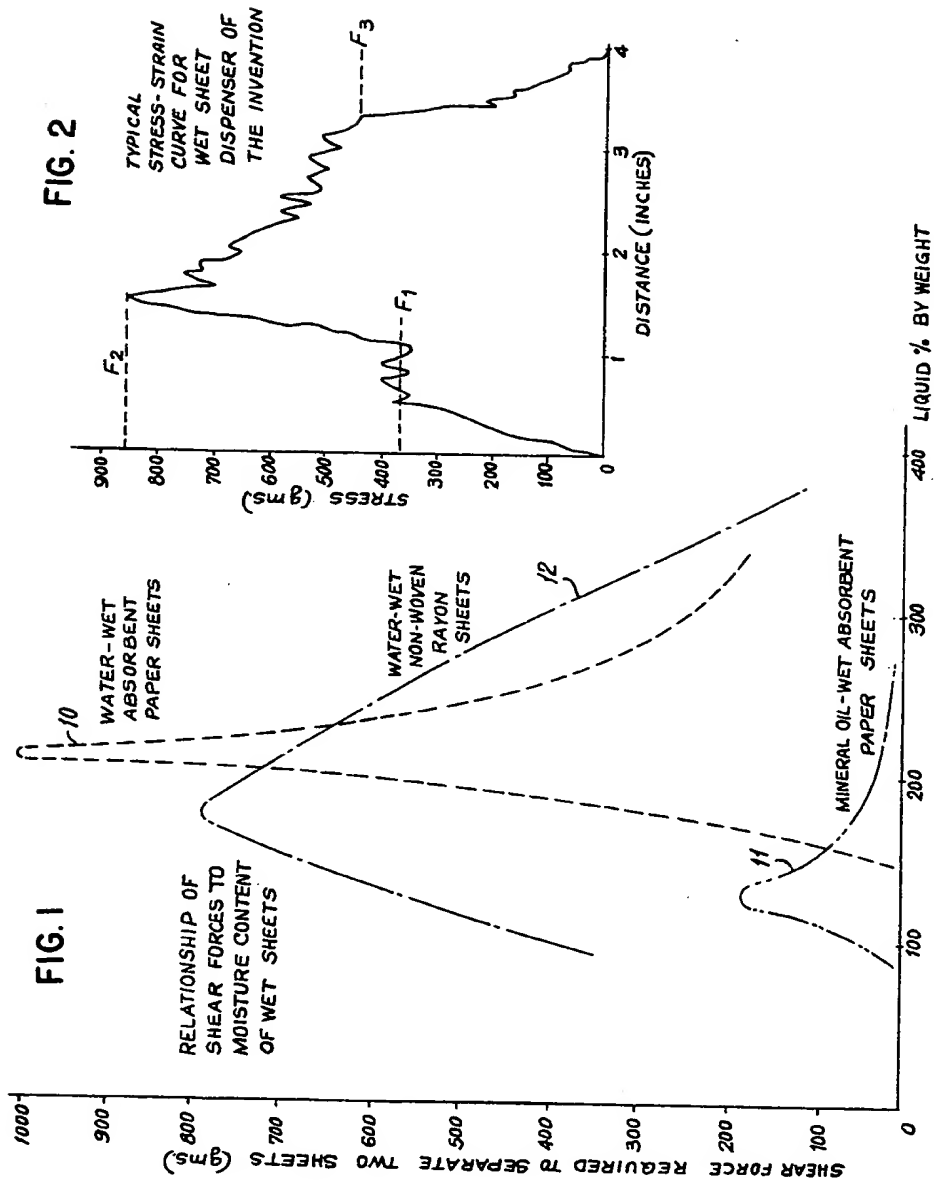
(i) a flexible plastics hinge integral with said cover and said container for mounting the former to the latter,

(ii) sealing surfaces for forming a seal with the container when the cover is in its closed position, and

(iii) a plurality of locking detents integrally formed on said cover, aligned with the locking detents on said container for engaging the latter when the cover is in its closed position and holding the cover in such position to maintain the substantially moisture-proof seal between the interior of the container and the atmosphere; and the detents on said insert and the recesses and posts in said container support and maintain the insert at said fixed position within the container when the successive sheets are removed therefrom through said sheet restricting opening yet permit manual removal of the insert from the container for access to the interior thereof.

19. A bulk package for individually dispensing substantially wet sheets from an interengaged stack of such sheets substantially as hereinbefore described with reference to the accompanying drawings.

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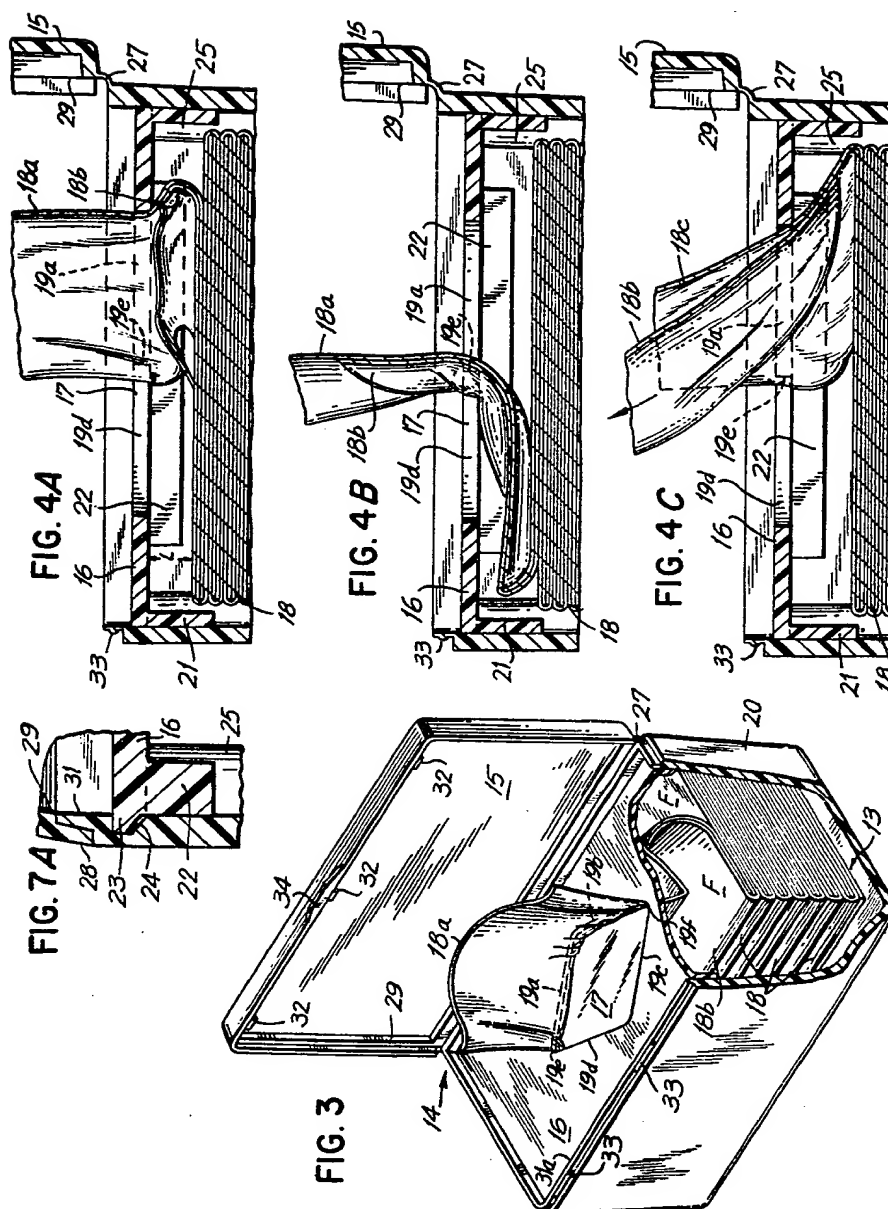


FIG. 5

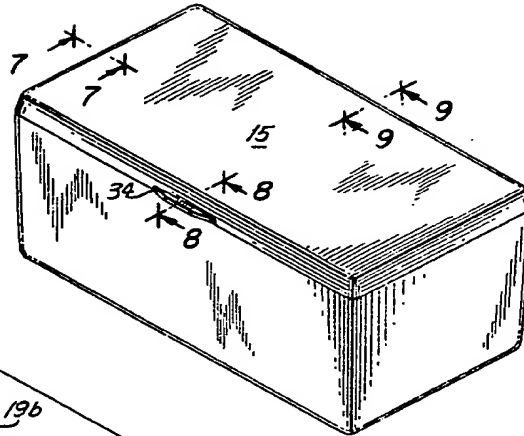


FIG. 6

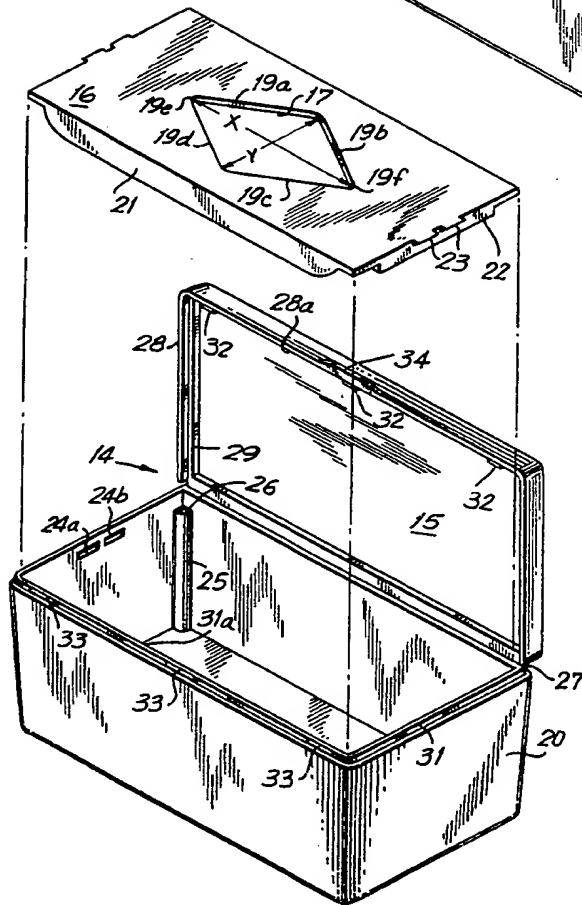


FIG. 7

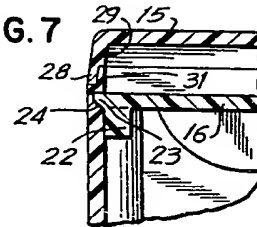


FIG. 8

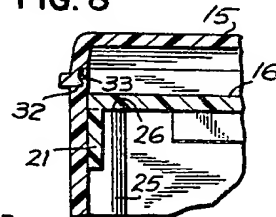
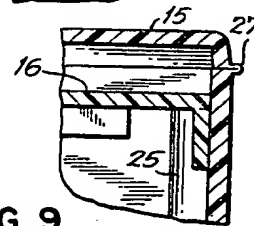


FIG. 9



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